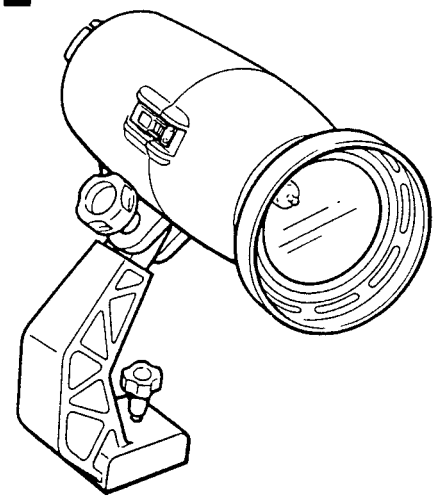
HVL-M20

SERVICE MANUAL

US Model
Canadian Model
AEP Model



SPECIFICATIONS

Material Front and rear casings, Arm: ABS
Front glass: glass

Waterproof facility
O-ring, 2 buckles

Usable depth Up to 75 meters (246 feet)

Power requirements
Supplied from Sony NP-77, NP-77H or NP-77HD rechargeable battery packs

Bulb 20 W halogen lamp (1)

Continuous lighting time

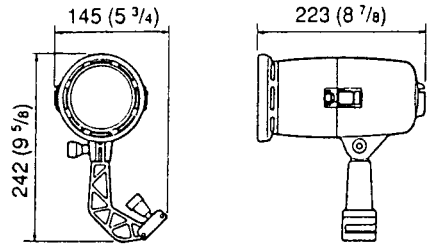
	Lighting time
NP-77	30 min.
NP-77H	35 min.
NP-77HD	35 min.

Color temperature
3200°K

Life of bulb Approx. 100 hours (average)

Underwater illumination distance
Approx. 2 m (6.5 feet) (The figure varies depending on clearness of the water.)

Dimensions
unit: mm (inches)



Weight Approx. 1.5 kg (3 lb 5 oz) incl. the arm, not incl. the battery pack

Accessories supplied
Spare halogen lamp (1)
(stored in the battery pack holder)
Spare O-ring (1)
Grease (1)

Optional accessory
Maintenance kit ACC-809

Design and specifications subject to change without notice.

MICROFILM

UNDERWATER VIDEO LIGHT

SONY®

TABLE OF CONTENTS

Section	Title	Page
SECTION 1. GENERAL		
	Feafures	3
	Precautions	3
	Notes on the O-ring	3
	Parts identification	4
	Preparations	
	1 Charge the battery pack.	4
	2 Install the charged battery pack.	4
	3 Check the O-ring.	4
	4 Joint the front and rear casings.	5
	5 Attach the arm.	5
	6 Attach the video light to the marine pack.	5
	Turning the light on	6
	Adiusting the angle	6
	Opening the front and rear casings	6
	Removing the battery pack	7
	Replacing the bulb	7
	Pre-recording check-list	7
	Check list for hydraulic pressure testing (Underwater testing)	8
	Water leakage test	10
SECTION 2. DISASSEMBLY		
	2-1. How to check to print board	12
SECTION 3. DIAGRAMS		
	3-1. Printed wiring board	13
	3-2. Schematic diagram	13
SECTION 4. EXPLODED VIEW		14
SECTION 5. ELECTRICAL PARTS LIST		15

SECTION 1
GENERAL

This section is extracted from instruction manual.

Features

The HVL-M20 is a video light with 20 W illumination capacity for underwater video recording. It can be attached to the accessory shoe of the Sony MPK-TRS, MPK-VX1, MPK-TR and MPK-F40/F340 marine pack.

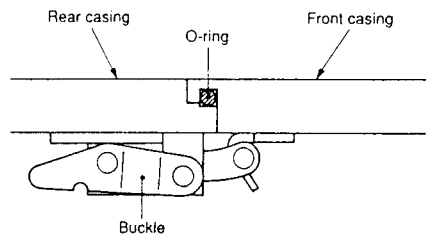
- Compact and lightweight, suitable for underwater recording.
- UP to 35 minutes of continuous lighting is possible (with Sony NP-77H or NP-77HD rechargeable battery pack).
- Usable at a depth of 75 meters (246 feet).
- The light uses the same kinds of rechargeable battery packs as does the video camera.

Precautions

- Do not keep the light turned on for more than 1 minute on land. The front casing may be damaged by overheating and this may cause water to leak in.
- Never look directly at the light while the video light is on.
- Avoid rough handling of the video light. Be careful not to drop it.
- After using the light in the sea, submerge the video light in fresh water for a while with the buckles fastened to thoroughly remove the sea water. Then rinse it with fresh water and dry it with a soft cloth.
- To clean the video light use fresh water or a mild detergent solution. Never use solvents such as alcohol, benzene, thinner or oil . They might damage the finish or the light itself.
- Avoid storing the video light in a hot or very cold place, in a place subject to direct sunlight or excessive dust, or together with naphthalene or camphor. This will damage the video light.
- When transporting the video light, remove the battery pack to avoid accidentally turning the light on.

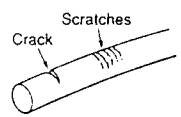
Notes on the O-ring

The O-ring assures the waterproof function of the HVL-M20. To maintain waterproof integrity, use it correctly. Incorrect operation and attachment may cause water to leak in.



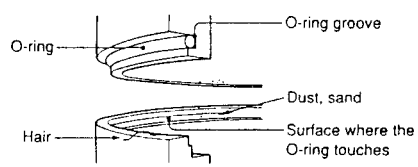
Check that there are no scratches or cracks.

Scratches or cracks on the O-ring may cause water to leak in. If there are any, replace the damaged O-ring with a new one.
Do not remove the O-ring from the groove with a metal tool or a tool with a sharp point.



Remove any dust, sand or hair from the O-ring.

Check that there is no dust, sand, or hair on the O-ring, or in the groove or on the surface where it touches. If there is, remove it completely, or the O-ring and the surface of the video light body may be damaged and water may leak in.

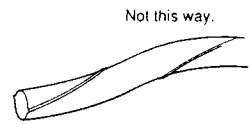


Grease on the O-ring.

The grease protects the O-ring from wear. After checking that there are no cracks or dust on the O-ring, grease it using the finger. During greasing, recheck that there are no cracks or dust. Never use cloth or paper for greasing because the fibers may cling.

Do not twist the O-ring.

Put the O-ring in the groove evenly. Never twist it.



Do not trap the O-ring between the casings.

When closing the casing, be careful not to trap the O-ring between the front and rear casings. If this happens, not only will the O-ring be damaged, but also water may leak in.

Storage

Store the supplied spare O-ring in a cool place, packed in the original carton. Be sure to avoid the following.

- Exposure to direct sunlight
- Placing a heavy object on the O-ring
- Folding the O-ring

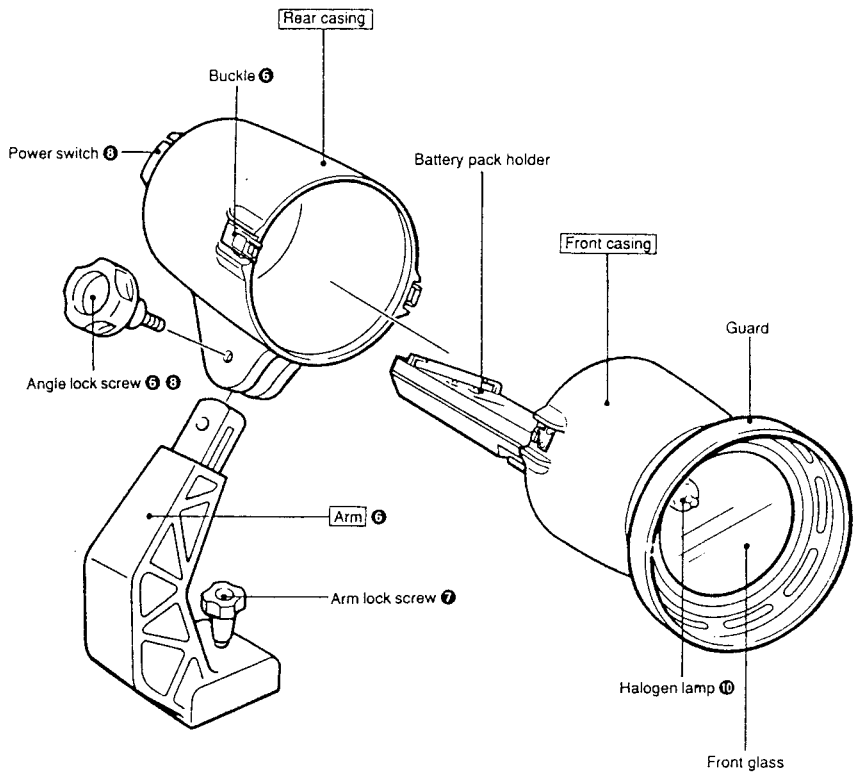
Useful life of the O-ring

It depends upon the maintenance and the length of use, but we recommend changing the O-ring every one or two years.

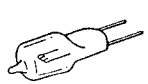
Sony does not accept liability for damage to the underwater video light and for the cost of recording if water leakage caused by incorrect operation occurs.

Parts Identification

For further details, refer to the page numbers next to each item.



Accessories supplied

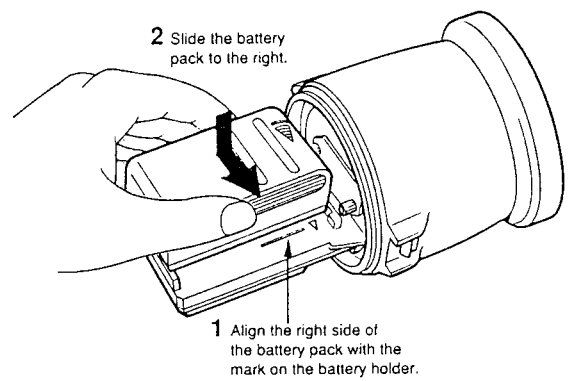
Spare O-ring ❸	Grease ❸	Bulb (stored in the battery pack holder) ❿
		

Preparations

1 Charge the battery pack.

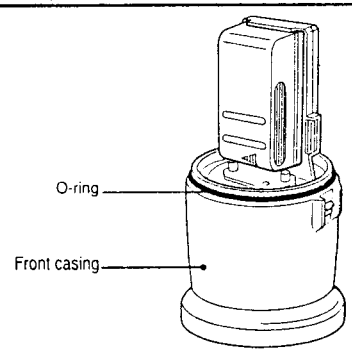
- Use the Sony NP-77, NP-77H or NP-77HD rechargeable battery packs provided for video cameras.
- Refer to the instructions of the video camera regarding the battery charging.

2 Install the charged battery pack.



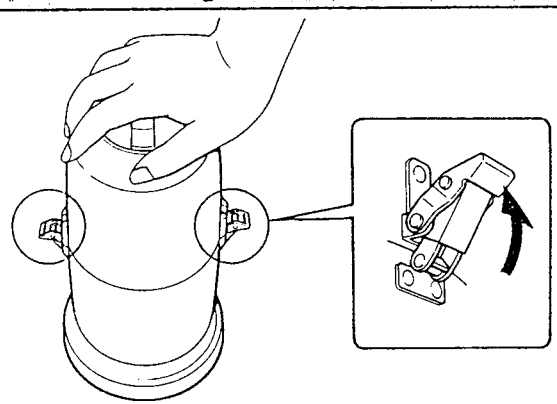
3 Check the O-ring.

For correct handling of the O-ring, see page 3.



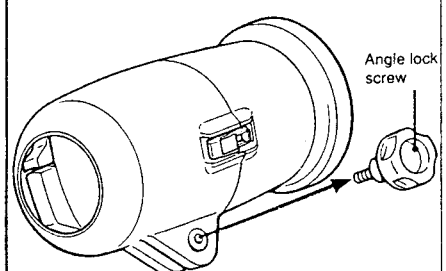
4 Joint the front and rear casings.

Press down the rear casing towards the front casing and fasten the two buckles.

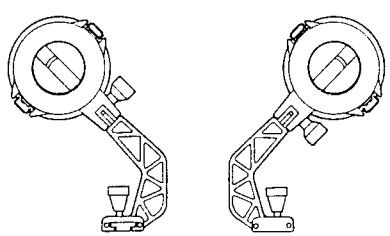


5 Attach the Arm.

1 Turn and remove the angle lock screw.



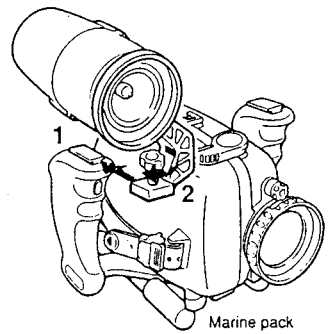
2 Insert the arm and turn the angle lock screw to secure the arm.
The following two arm positions can be selected depending on the direction in which the arm is inserted.



6 Attach the video light to the marine pack.

1 Insert the arm bracket in the accessory shoe of the marine pack.

2 Tighten the arm lock screw.



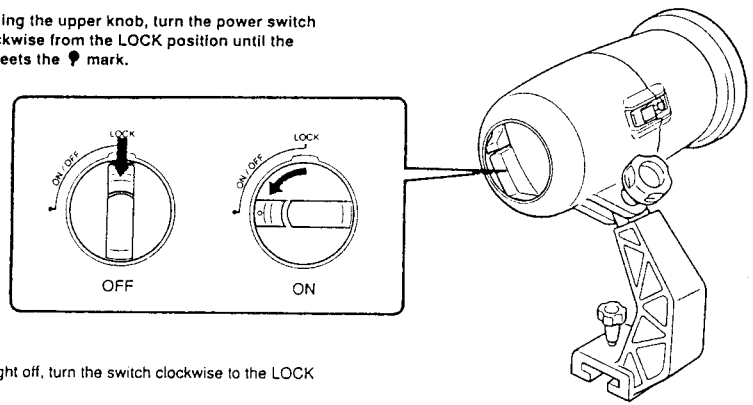
Marine pack

The underwater video light is now ready for use.

Try to turn the light on before putting it into water. (For turning the light on, see page 8.)

Turning the Light On

While pressing the upper knob, turn the power switch counterclockwise from the LOCK position until the white dot meets the ▼ mark.

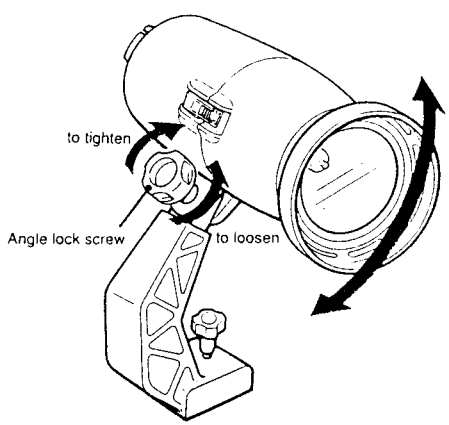


To turn the light off, turn the switch clockwise to the LOCK position.

Adjusting the Angle

1 **Loosen the angle lock screw and adjust the angle of the video light so that the object is illuminated.**

2 **Tighten the angle lock screw to fix the angle.**

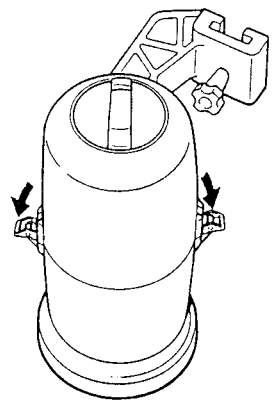


Opening the Front and Rear Casings

Before opening the casing

Be sure to dry the video light and yourself so that no water drops inside. Water drops inside the casings may damage the video light.

1 Unfasten the two buckles.

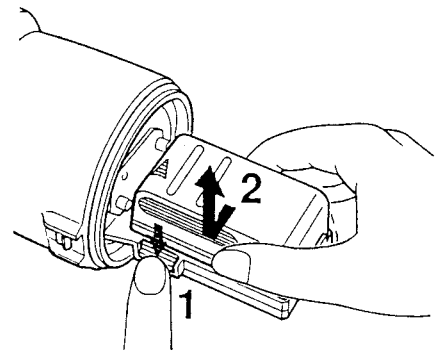


2 Open the front and rear casings.

Removing the battery pack

1 Press the lever located on the side of the battery holder.

2 Slide the battery pack to the left and lift it up.



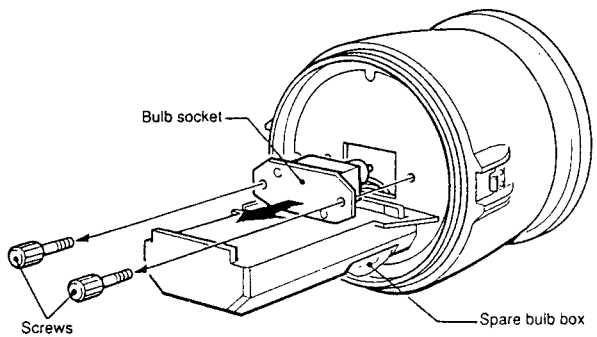
Replacing the Bulb

A spare bulb is supplied with the unit. For replacement, always use the Sony halogen lamp specified for the HVL-M20.

1 Open the casings (see page 9).

2 Remove the battery pack (see page 9).

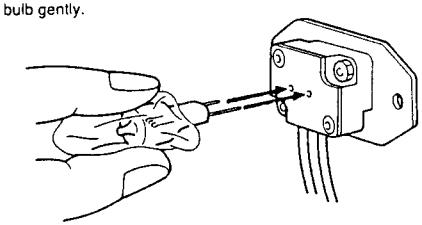
3 Remove the two screws from the bulb socket.



4 Pull out the bulb socket gently.

5 Remove the old bulb from the socket.
- The bulb is hot when it is burned out. Before removing the bulb, wait until the bulb cools down.

6 Plug in the spare bulb gently.



- To prevent the bulb from being smudged with finger prints, plug in the bulb holding it with a plastic bag or a dry cloth. If the bulb is smudged, the light may smoke when it is turned on or the bulb life may be shortened. If you have touched the bulb surface, clean it completely.
- *Do not plug the bulb into the socket forcibly.*

7 Replace the bulb socket into the front casing and secure it with the two screws.

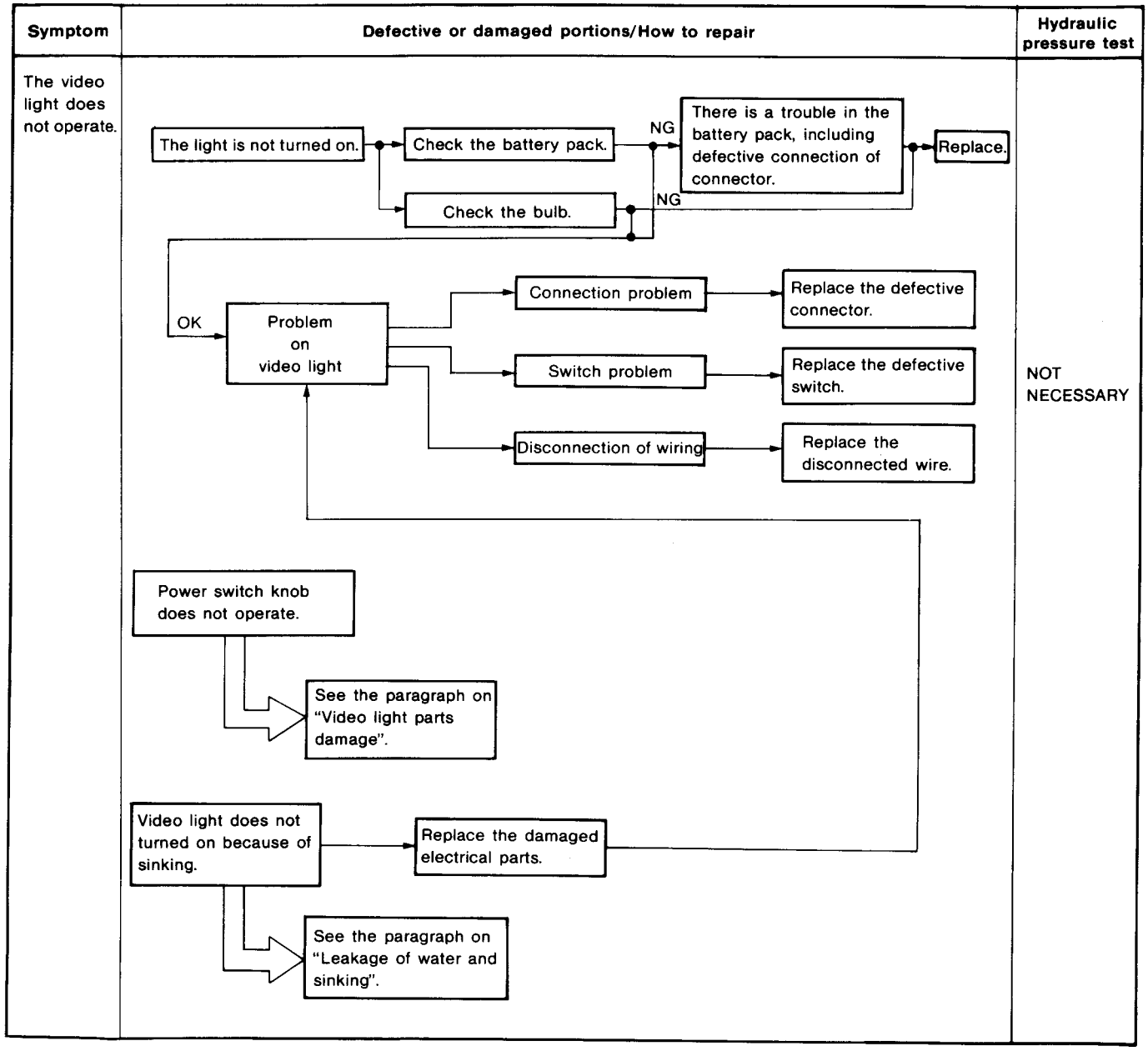
Pre-recording Check-list

Before diving, check if the light can be turned on and go over the following checklist.

Item	Checkpoints
Battery pack	• Fully charged.
Bulb	• Not burnt out. • Correctly plugged into the socket.
O-ring	• No scratches or cracks. • No dust, sand or hair around it. • Correctly set in the groove.
Buckles	• Correctly fastened.

CHECK LIST FOR HYDRAULIC PRESSURE TESTING (UNDERWATER TESTING)

Underwater video light HVL-M20 requires a hydraulic* pressure testing (underwater testing) to find the defective portion and to confirm after repairing the waterproofed portions.
Please be sure to check the symptoms with the following checklist before repairing.


Symptom
Defective or damaged portions/How to repair
Hydraulic pressure test
The video light does not operate.
The light is not turned on.
Check the battery pack.
NG
There is a trouble in the battery pack, including defective connection of connector.
Replace.
Check the bulb.
NG
OK
Problem on video light
Connection problem
Replace the defective connector.
Switch problem
Replace the defective switch.
Disconnection of wiring
Replace the disconnected wire.
NOT NECESSARY
Power switch knob does not operate.
See the paragraph on "Video light parts damage".
Video light does not turned on because of sinking.
Replace the damaged electrical parts.
See the paragraph on "Leakage of water and sinking".

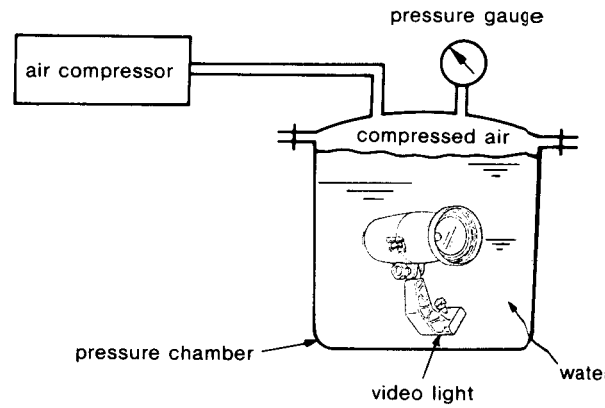
Symptom	Defective or damaged portions/Details of symptoms			How to repair	Hydraulic pressure test
Video light parts damage	housing	external of housing	The housing is scratched.	Repair the housing.	NECESSARY**
		groove for O-ring/ plane of contact with O-ring	slight damage	Grind the damaged portion with water-proof sandpaper.	NECESSARY
			serious damage	Replace the damaged part.	
		O-ring	damage or rotting	Replace the O-ring. (The life of O-ring is approx. 2 years.)	NOT NECESSARY
		buckle (with screws)	damage or coming off	Replace the buckel. (If the hold of screw on the housing is widened, repair the housing.)	NOT NECESSARY
	front glass	front glass	damage	Replace the front glass and overhaul the front unit.	NECESSARY
	Power switch knob	knob	damage or coming off	Replace the control lever.	NOT NECESSARY
		shaft	transformation	Replace the control lever shaft.	NECESSARY
Leakage of water and sinking	Check the cause of sinking by hydraulic pressure test. (Discover the leaked portion.)			Repair the defective portion that was discovered by hydraulic pressure test. Replace the damaged parts.	NECESSARY

Note:

*: Hydraulic pressure test
Hydraulic pressure test is the way to check the pressure-preventing and waterproof characteristics of underwater video light. A special water tank which is called a pressure chamber is required in this test.
See the right figure.
1. Sink the video light into the water of the pressure chamber.
2. Press the unit by compressed air.

The unit receives heavy pressure in the chamber. If the waterproofed portions except for the area between the front and rear bodies are defective, water leakage may not occur till the unit receives the pressure.

**: The hydraulic pressure test is necessary except the extremely slight damage.



WATER LEAKAGE TEST

Water leakage test is to test the video light for water leakage by sinking it in the water of tank; it is an effective measure to discover the leaked portion in the area between the front and rear bodies.
Before and after repairing the unit, be sure to check it by the water leakage test.

The portion that water leakage may occur

(1) The space between the front and rear bodies
The waterproof integrity of the video light is maintained by the O-ring, the O-ring groove, and the surface of the front body where the O-ring touches.

- In the shallow water (2 meters below the water): The water pressure is not heavy, so that the waterproof function is assured by the repulsion of O-ring.
- In the deep water:
  The more the water pressure is put on, the more O-ring contacts the front and rear bodies firmly.

Therefore water leakage through the space between the front and rear bodies may be easy to occur in the shallow water.

(2) Other waterproofed portions (Ex. The front glass, shaft of power switch knob, etc.)
The waterproof function of all other portions is maintained by O-rings, screws and nuts. And it is rarely that water leakage occurs on these portions, because they are not able to touch directly on use.

The cause of water leakage

(1) Leakage through the area between the front and rear bodies
   a) When the video light is closed without removing any dust, sand or hair from the O-ring, the O-ring groove, and the surface of the front body where the O-ring touches, water may leak in.
   b) When the video light is closed with the O-ring and the cables being pinched between the front and rear bodies, water may leak in.
   c) When there are some scratches or cracks on the O-ring, water may leak in.
   d) When the surface of the front body where the O-ring touches is damaged, water may leak in.

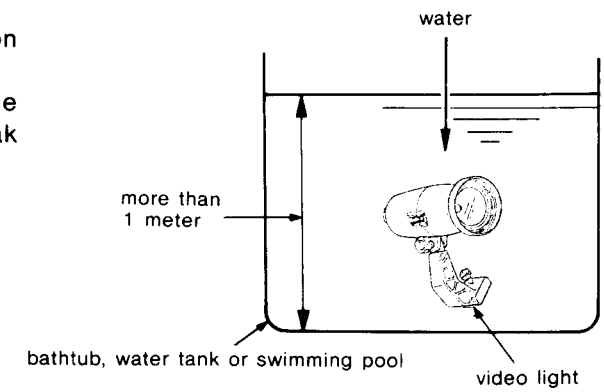
(2) Leakage through other waterproofed portions
   a) When the surface of the parts where the O-ring touches is damaged, water may leak in.
   b) When the screws or nuts for installing loosen, water may leak in.
   c) When the screws and nuts are tightened to attach the O-ring and waterproof components, if there are some dust, sand or hair on the O-ring, on the surface of the video light body or attached components where the O-ring touches, water may leak in.
   d) If the O-ring is forgot to put on the waterproofed portion when assembling after repairing, water may leak in.

How to test

Note:
Water leakage test is an effective measure to discover the leaked portion in the area between the front and rear bodies.
The cause which are specified in (1)-a) to (1)-e) and (2)-d) of the paragraph "The cause of water leakage" can be almost discovered by this test.
Water leakage on other portions can not be discovered by this test, so that the hydraulic pressure test is necessary.
Before and after repairing the unit, be sure to check it by the water leakage test.

Preparation:
Water leakage test requires a bathtub, water tank or swimming pool that is filled with the water.
It is desirable that the depth of water is more than 1 meter, if possible.

Test:
After closing the video light, sink it into the water and leave it in the water at least for 15 to 20 minutes.



Note on repairing

Before repairing:

Water leakage occurs caused by not only defect on the unit but also incorrect operation.

Check the symptom and leaked portion which are explained by the owner, and then discover the correct portion of leakage and check the cause of leakage by water leakage test.

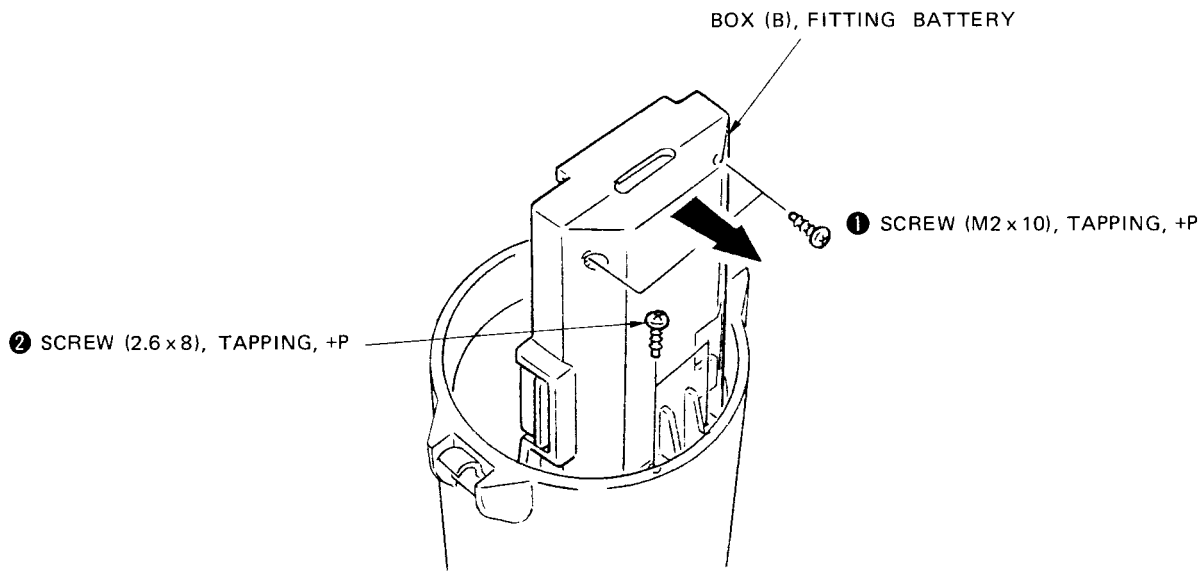
(1) When assembling the components of waterproofed portion after repairing, be careful with the following notes.
- Check that there are no scratches or cracks on the surface of the component where the O-ring touches.
- Check that there are no scratches or cracks on the O-ring.
- Check that no dust, no sand, no hair are on the O-ring.
- Grease the O-ring using a finger before putting it in the groove.
  Never use cloth or paper for greasing because the fibers may remain on the O-ring.
- Check that there are no dust, sand or hair on the surface of the component before assembling.

(2) When repairing the damaged or deformed portion on the surface of the video light body where the O-ring touches, be carefull with the following notes.
- The only extremely slight damage can be repaired by grinding with waterproof sandpaper.
- When grinding the damaged or deformed portion, use the waterproof sandpaper whose particles are fine with some water.
- Don't grind the damaged or deformed portion on the surface of the video light partially.
  Make the surface smooth by grinding both the damaged or deformed portion and the surroundings.
- Don't use any putty for repair.
  Because it may come off by the water pressure.

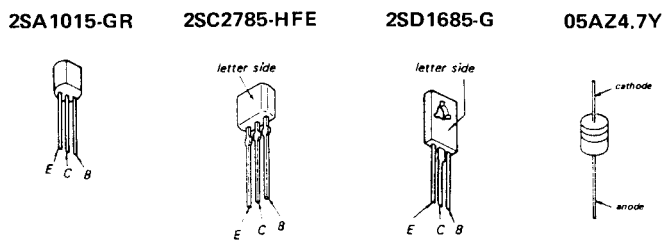
SECTION 2
DISASSEMBLY

HOW TO CHECK TO THE PRINT BOARD

1. Open the front-case and rear-case on the page 6.
2. Remove two screws ❶ and ❷ .
3. Remove of box (B), fitting battery in the direction shown by the arrow.

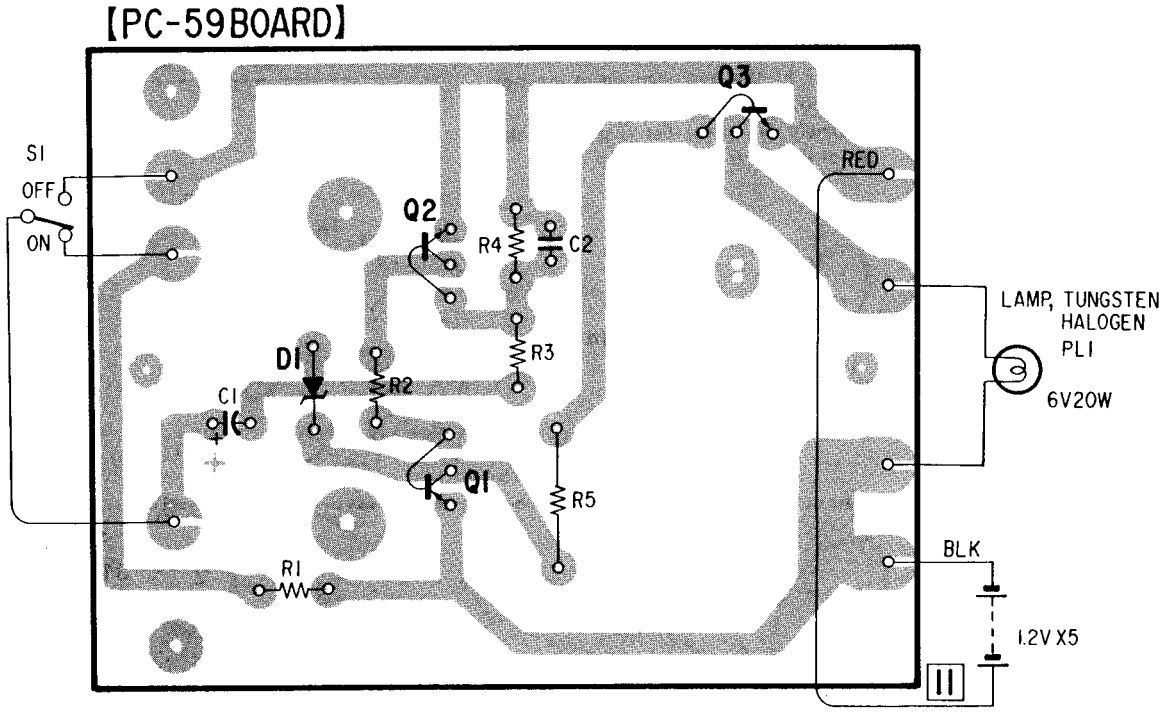


SEMICONDUCTOR LEAD LAYOUTS



SECTION 3
DIAGRAMS

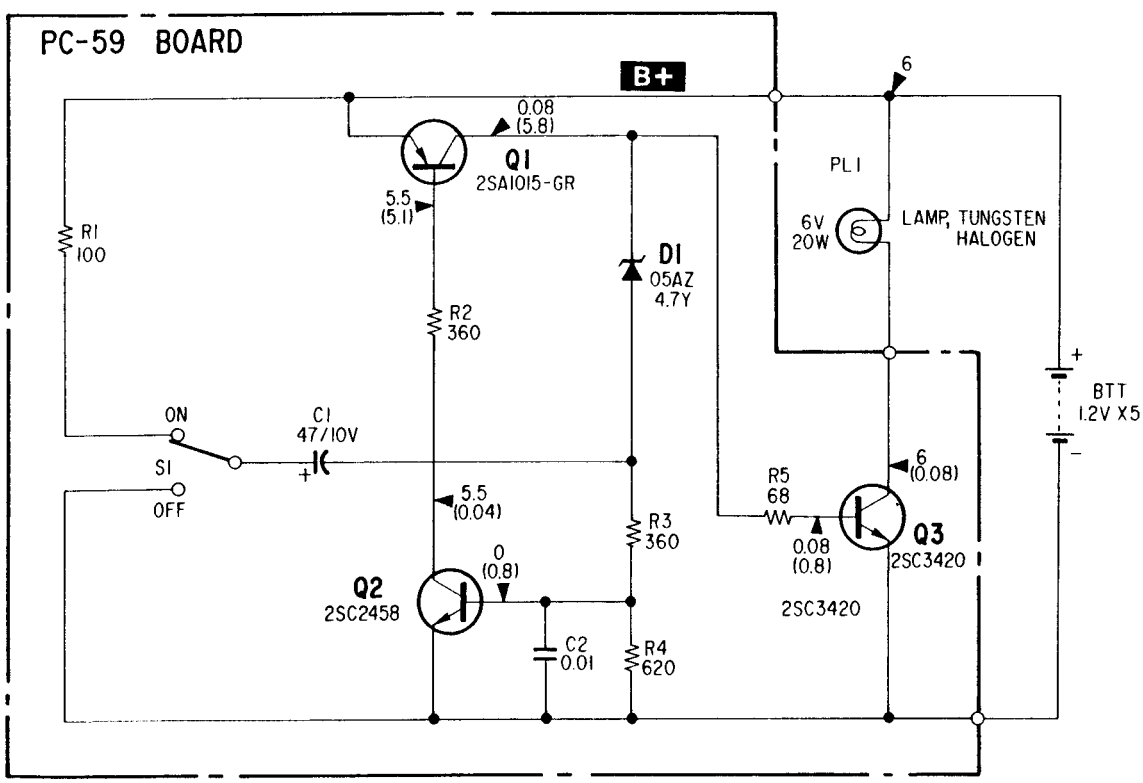
3-1. PRINTED WIRING BOARD



Note:

- ○—— : parts extracted from the component side.

3-2. SCHEMATIC DIAGRAM



Note:

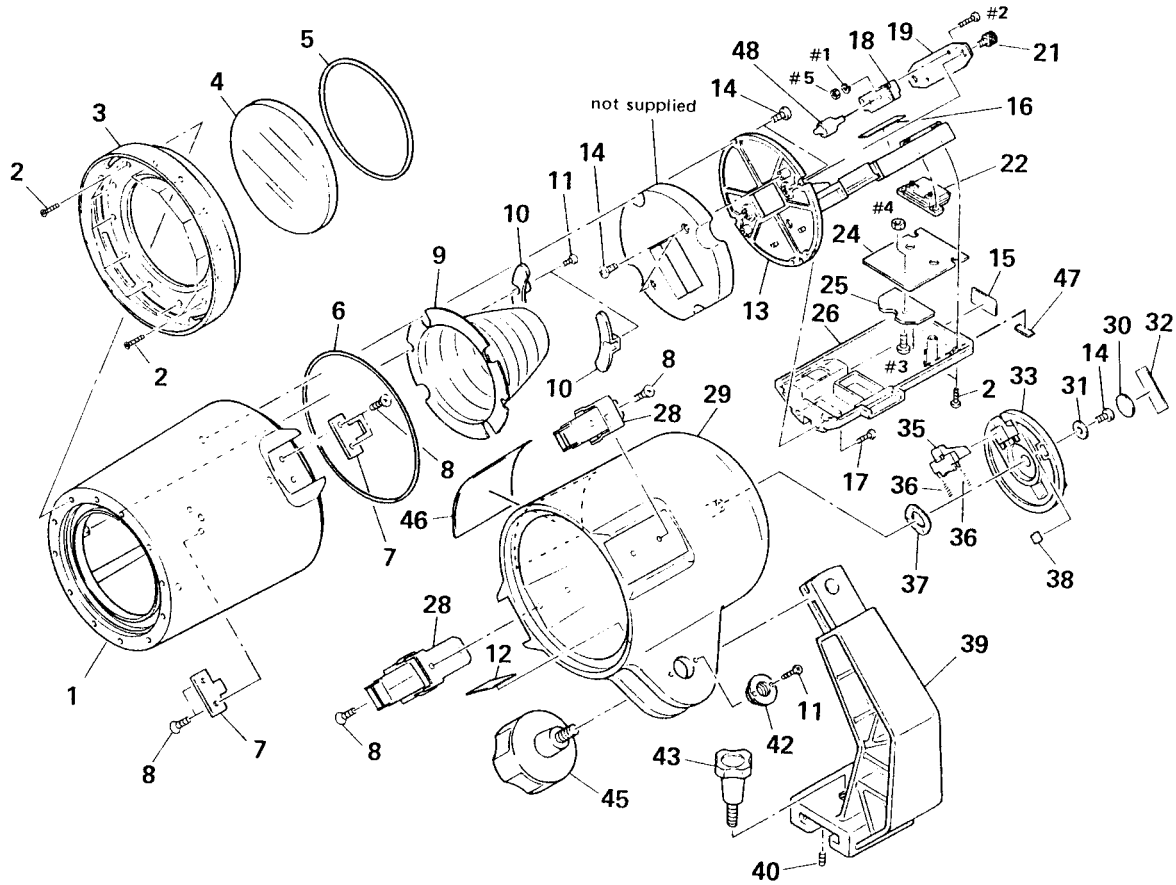
- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4W or less unless otherwise specified.
- B+ : B+ line.
- Voltage and waveforms are dc with respect to ground under no-signal (detuned) conditions.
  no mark: S1 OFF
  ( ): S1 ON
- Voltages are taken with a VOM. (Input impedance 10MΩ) Voltage variations may be noted due to normal production tolerances.

SECTION 4 EXPLODED VIEW

NOTE:

- –XX, –X mean standardized parts, so they may have some differences from the original one.
- Color Indication of Appearance Parts
  Example:
  KNOB, BALANCE (WHITE) ... (RED)
  ↑ Parts color ↑ Cabinet's color
- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list is given in the last of this parts list.

Note:
Items marked " ⁄ " are parts in relation to waterproof.
Replace these components with Sony parts.
Be sure to check up waterproofing after repair.



Ref. No.	Part No.	Description	Remark
1	⁄ 3-944-992-01	CASE, FRONT	
2	2-115-925-11	SCREW (2) (M2X10), TAPPING	
3	⁄ 3-944-990-01	PROTECTOR, FRONT	
4	⁄ 3-944-980-01	GLASS, FRONT	
5	⁄ 3-945-131-01	RING (G70), O	
6	⁄ 3-945-133-01	RING (G85), O	
7	3-945-329-01	LOCK (B), SNAP	
8	3-945-132-01	SCREW (M3X8), TAPPING	
9	3-944-984-01	MIRROR	
10	3-944-985-01	RETAINER, MIRROR	
11	2-115-925-01	SCREW (2) (M2X5), TAPPING	
12	* 3-946-097-01	LABEL, CAUTION	
13	3-944-997-01	BRACKET (A), BATTERY	
14	2-186-307-11	SCREW (M3X10), TAPPING, +P	
15	* 3-946-070-01	LABEL, MODEL NUMBER	
16	* 3-946-098-01	LABEL, INSTRUCTION	
17	2-398-048-11	SCREW (2.6X8), TAPPING, +P	
18	1-517-100-21	SOCKET, LAMP	
19	3-944-982-01	BRACKET, SOCKET	
21	3-944-983-01	SCREW, SOCKET BRACKET	
22	1-537-241-81	TERMINAL BOARD (BATTERY)	

Ref. No.	Part No.	Description	Remark
25	3-944-981-01	HEAT SINK	
26	3-944-994-01	BOX (B), FITTING BATTERY	
28	3-945-331-01	LOCK (A), SNAP	
29	⁄ 3-944-991-01	CASE, REAR	
30	3-944-977-01	PLATE, ORNAMENTAL, SWITCH	
31	2-186-306-71	WASHER, 4 φ	
32	* 3-946-099-01	SEAL, CAUTION	
33	3-944-989-01	KNOB, SWITCH	
35	3-944-979-01	LEVER, LOCK	
36	3-944-978-01	SPRING, SWITCH LOCK	
37	3-945-129-01	WASHER, WAVED	
38	3-945-330-01	MAGNET	
39	3-944-993-01	ARM, LIGHT	
40	2-398-051-11	SCREW (M4X8), 6 SQUARE HOLE	
42	* 2-398-047-01	NUT, FASTENING, ARM	
43	2-398-015-01	BOLT, ARM FIXED	
45	A-6767-185-A	KNOB BLOCK ASSY, FASTENING	
46	* 3-946-100-01	LABEL, WARNING (US, Canadian)	
46	* 3-946-101-01	LABEL, WARNING (AEP)	
47	* 3-165-810-01	LABEL	
48	1-518-691-11	LAMP, TUNGSTEN HALOGEN 6.0V 20W	

SECTION 5
ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- –XX, –X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL: Metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA...: μA..., uPA...: μPA...,
  uPB...: μPB..., uPC...: μPC...,
  uPD...: μPD...
- CAPACITORS
  uF: μF
- COILS
  uH: μH

Ref. No.	Part No.	Description			Remark
	A-6768-704-A	PC-59 BOARD, COMPLETE			
		**********			
		< CAPACITOR >			
C1	1-124-589-11	ELECT	47uF	20%	16V
C2	1-161-051-00	CERAMIC	0.01uF	10%	50V
		< DIODE >			
D1	8-719-109-80	DIODE RD4.7ES-B1			
		< TRANSISTOR >			
Q1	8-729-201-53	TRANSISTOR 2SA1015-GR			
Q2	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q3	8-729-820-07	TRANSISTOR 2SD1685-G			
		< RESISTOR >			
R1	1-249-405-11	CARBON	100	5%	1/4W
R2	1-247-820-11	CARBON	360	5%	1/4W
R3	1-247-820-11	CARBON	360	5%	1/4W
R4	1-247-826-00	CARBON	620	5%	1/4W
R5	1-249-403-11	CARBON	68	5%	1/4W
		MISCELLANEOUS			
		**********			
18	1-517-100-21	SOCKET, LAMP			
22	1-537-241-81	TERMINAL BOARD (BATTERY)			

Ref. No.	Part No.	Description	Remark
		ACCESSORIES & PACKING MATERIALS	
		**********	
	1-518-691-11	LAMP, TUNGSTEN HALOGEN	
	2-115-921-01	GREASE	
	3-336-617-01	BAG, PROTECTION	
*	3-338-735-01	BAG, PROTECTION	
	3-753-856-11	MANUAL, INSTRUCTION (ENGLISH, FRENCH, SPANISH)	
	3-753-856-41	MANUAL, INSTRUCTION (AEP) (GERAMAN, DUTCH, SWEDISH, ITALIAN, ARABIC)	
	3-753-856-51	MANUAL, INSTRUCTION (CHINESE) (AEP)	
*	3-944-723-01	INDIVIDUAL CARTON	
*	3-944-905-01	CUSHION (UPPER)	
*	3-944-906-01	CUSHION (LOWER)	
	3-945-133-01	RING (G85), O	
*	3-945-328-01	PAPER, HANDLING CAUTION	

HARDWARE LIST

****

#1	7-623-205-22	SW 2, TYPE 2
#2	7-627-553-77	SCREW, PRECISION +P 2X10
#3	7-682-548-04	SCREW +P 3X8
#4	7-684-023-04	N 3, TYPE 2
#5	7-622-205-05	N 3, TYPE 2

9-973-141-11

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